REMARKS

Claims 1 and 4-12 are pending.

The title has been amended as per the Examiner's suggestion.

Claim 1 was amended by defining the ranges which should be satisfied by the values of an in-plane retardation R_e, and a retardation in the direction of the thickness R_{th}, of the optically anisotropic member. This amendment is supported in the specification on page 30, line 8. Also, claim 1 has been amended to recite the subject matter of canceled claims 2-3.

Claim 5 was amended by further defining the layer comprising a material having a negative value of intrinsic birefringence recited in claim 4. This amendment is supported in the specification on page 9, lines 15 to 18 and page 10, lines 21 to 23.

New claim 9 is supported in the specification on page 9, lines 18 to 20 and page 10, lines 21 to 23.

New claim 10 is supported in the specification on page 11, lines 25 to 26 and in the disclosure of Preparation Example 1 on page 35 of the specification.

New claim 11 is supported by Preparation Example 1 in the specification on page 35, line 14.

New claim 12 is supported in the specification on page 11, lines 2 to 3.

No new matter has been added by way of the above-amendment.

Title of the Invention

The Examiner objects to the title of the invention for not being descriptive. In accordance with the Examiner's suggestion, the title has been amended as follows:

> *In-plane switching mode liquid crystal display device having a biaxial optically anisotropic member*

As such, withdrawal of the objection is respectfully requested.

Issues Under 35 U.S.C. §§ 102(b) and 103(a), Anticipation and Obviousness

The following prior art-based Rejections 1-5 are pending:

1) Claims 1-3 stand rejected under 35 U.S.C. §102(b) as being anticipated by Suzuki et al (USP 6,115,095).

2) Claim 4 stands rejected under 35 U.S.C. §103(a) as obvious over Suzuki in view of Mori et al. (USP 6,184,957).

3) Claims 5-6 stand rejected under 35 U.S.C. §103(a) as obvious over Suzuki in view of Yamaoka et al. (USP 6,417,904).

4) Claim 7 stands rejected under 35 U.S.C. §103(a) as obvious over Suzuki in view of Uejima (JP 2003-246014).

5) Claim 8 stands rejected under 35 U.S.C. §103(a) as obvious over Suzuki in view of Shuzo (JP 2003-149643).

Applicants respectfully traverse Rejections 1-5.

Advantages of the Presently Claimed Invention

The present invention relates to a liquid crystal display device of an in-plane switching mode. More particularly, the present invention relates to a liquid crystal display device which exhibits excellent antireflection property, scratch resistance and durability, provides a wide angle of field and achieves uniform display of images with great contrast at any angle of observation. These advantages are derived from the features which are now claimed, and:

> include a pair of polarizers which are a polarizer at an output side and a polarizer at an incident side and disposed at relative positions such that absorption axes of the polarizers are approximately perpendicular to each other and at least an optically anisotropic member and a liquid crystal cell which are disposed between the pair of polarizers, wherein $n_Z>n_X>n_y$ when, with respect to the optically anisotropic member, a refractive index in a direction of an in-plane slow axis is represented by n_X, a refractive index in a direction in-plane and perpendicular to the direction of an in-plane slow axis is represented by n_y, and a refractive index

in a direction of a thickness is represented by n_Z, each measured using light having a wavelength of 550 nm; and the in-plane slow axis of the optically anisotropic member and the absorption axis of a polarizer disposed closer to the optically anisotropic member are disposed at relative positions approximately parallel or approximately perpendicular to each other, wherein an in-plane retardation R_e (the unit: nm) and a retardation in the direction of the thickness R_{th} (the unit: nm) of the optically anisotropic member satisfy the following formulae:

$160 \leq R_e \leq 340$ and $-350 \leq R_{th} \leq -150$;

wherein the absorption axis of the polarizer at the output side and the in-plane slow axis of a liquid crystal of the liquid crystal cell under application of no voltage are disposed at relative positions parallel to each other, and the optically anisotropic member is disposed between the liquid crystal cell and the polarizer at the output side, and

wherein the in-plane slow axis of the optically anisotropic member and the in-plane slow axis of a liquid crystal of the liquid crystal cell under application of no voltage are disposed at relative positions approximately perpendicular to each other.

Applicants respectfully submit that the cited references do not teach or fairly suggest the features of the liquid crystal display device of present claim 1 nor the advantages derived therefrom. Applicants now turn to the cited references.

Suzuki

In the outstanding Office Action, the Examiner relies heavily on the features of Example 6 of column 16 in finding that the presently claimed invention is anticipated. Although Applicants disagree with the Examiner's position, Applicants have amended the claims to further distinguish from Suzuki. Specifically, the presently claimed invention now recites an in-plane retardation R_e (having the units of nanometers) and a retardation in the direction of the thickness R_{th} (having the units of nanometers) of the optically anisotropic member which satisfy the

following formulae:

$160 \leq R_e \leq 340$ and $-350 \leq R_{th} \leq -150$.

Applicants respectfully submit that the device of Example 6 of Suzuki does not have these features, and Suzuki fails to teach or fairly suggest modifying the device of Example 6 to have these features or the advantages derived therefrom.

As evidence of this fact, Applicants enclose herewith a Declaration under 37 CFR 1.132 by Mr. Kenichi Harai of the Assignee (Zeon Corporation), who is one skilled in the art.

As described in the Declaration, Mr. Harai conducted a Supplemental Experiment by computer simulation in order to prove: a) that Example 6 of Suzuki does not have values of R_e and R_{th} which fall within the ranges defined in present claim 1; and b) that the inventive liquid crystal display devices have unexpectedly superior omni-directional contrast when the optically anisotropic member satisfies the following formulae: $160 \leq R_e \leq 340$ and $-350 \leq R_{th} \leq -150$.

The results of Mr. Harai's experiments are summarized in Table 1 which is reproduced below for the Examiner's convenience.

Table 1

*Example	R_e	R_{th}	Omni-directional Contrast Ratio
Example 2	160	-181	15 or larger
Example 3	339	-350	14 or larger
Example 4	174	-150	14.4 or larger
Comparative Example 2	67	-100.5	8.4 or larger
Comparative Example 3	No compensation layer present		9.3 or larger

* Examples 2 to 4 show the data for the liquid crystal display device having elements arranged as illustrated in Fig. 3 of the present specification having the feature of the presently claimed invention in which the values of in-plane retardation Re and a retardation in the direction of the thickness Rth of the optically anisotropic member is set near the critical values as defined in the formulae in claim 1. Comparative Example 2 shows the data for the in-plane switching type liquid crystal display disclosed in Example 6 of Suzuki which is cited in the outstanding Office Action. Comparative Example 3 is the same as Comparative Example 2 except that no optical compensator is used.

As clearly seen from Table 1, the liquid crystal display device having an arrangement of optical elements of the first embodiment as illustrated in Fig. 3 of the present specification has a omni-directional contrast ratio of 14 or larger even when the optical parameters are near the end-points of the ranges of the optical parameters, Re and Rth, defined in claim 1.

In contrast, the in-plane switching type liquid crystal display in Example 6 of Suzuki has an omni-directional contrast ratio of 8.4 or larger which is greatly inferior to the omni-directional contrast ratio of the inventive Examples 2-4. It is further noted that the in-plane switching type liquid crystal display in Example 6 of Suzuki has an omni-directional contrast ratio which is even more inferior than a crystal display in which an optical compensator is not present. It is clear that the omni-directional contrast of the liquid crystal display apparatus of presently claimed invention has a distinct advantage over that of the liquid crystal display disclosed in Example 6 of Suzuki. Thus, the presently claimed invention of claim 1 is not anticipated by Suzuki and is not obvious from Suzuki. Claims 2 to 3 which directly depend on claim 1 are also considered to be patentable over Suzuki.

Furthermore, the Examiner will note that Mr. Hirai has commented on what the artisan would expect for the properties of the liquid crystal display by modifying the liquid crystal display of Example 6 of Suzuki to fall within the present claims. As stated at page 5, lines 15-21 of the Declaration, Mr. Hirai believes that one skilled in the art would expect that modifying the optically anisotropic member of Example 6 of Suzuki, to satisfy the following formulae: $160 \leq R_e \leq 340$ and $-350 \leq R_{th} \leq -150$ (as claimed), would **not** result in an increase in the omni-directional contrast ratio based on reading Suzuki and the other cited references, since Suzuki and the other cited references do not even mention the formulae and one skilled in the art would not even consider limiting the LCD with such a formulae, and there is no reason to modify the optical compensator by introducing the limitation set forth above.

Clearly, the results found by Mr. Hirai as set forth in Table 1 of the Declaration exceed these expectations, i.e., the results are ***unexpected***.

As such, reconsideration and withdrawal of **Rejection 1** are respectfully requested.

Suzuki and Mori

With respect to **Rejection 2**, the Examiner has taken the position that present claim 4 is obvious over the combination of Suzuki and Mori et al. (U.S. Patent No. 6,184,957 "Mori").

Applicants consider that claim 1, on which claim 4 depends is patentable over Suzuki for the reasons set forth above. Applicants respectfully submit that Mori fails to cure the deficiencies of Suzuki with respect to the features of present claim 1.

In addition, Mori discloses to use only an optical compensatory sheet having an optically negative uniaxial property and an optical axis parallel to a plane of the sheet between at least one side of the liquid crystal cell and the polarizing sheet (ABSTRACT and FIG. 2(A) of Mori). However, Mori does not disclose an optically biaxial anisotropic member of the presently claimed invention at all, and instead, Mori discloses an optical compensatory sheet having an optically negative uniaxial property (see column 8, line 12 of Mori). As the Examiner is aware, the optically uniaxial property is characterized in that two of the refractive indices in x, y or z directions are equal, for example, as expressed by the formulae: nx>ny=nz or nx=ny>nz. In contrast, the optically biaxial property is characterized in that all three refractive indices in x, y or z directions are different, for example, as expressed by the formulae: nz>nx>ny as defined in claim 1. The optical compensatory sheet having an optically negative uniaxial property disclosed in Mori and the optically biaxial anisotropic member which is characterized by a relation: nz>nx>ny of the presently claimed invention have quite different optical properties (see column 8, lines 15 to 20 of Mori). Therefore, one of ordinary skill in the art cannot expect that the use of the polymers having a negative value of intrinsic birefringence which is disclosed to give a good result in the optical compensatory sheet having an optically negative uniaxial property disclosed in Mori would also give a good result in the biaxial anisotropic member of the presently claimed invention. According to MPEP 2143.02, there must be a reasonable expectation of success to do what Applicants now claim in order for an obviousness rejection to be tenable. Here, there would be no reasonable expectation of success, since one of ordinary skill in the art would not expect that the use of the polymers having a negative value of intrinsic birefringence which is disclosed to give a good result in the optical compensatory sheet having an optically negative uniaxial property disclosed in Mori would also give a good result in a

biaxial anisotropic member. Thus, Applicants submit that it is not appropriate to combine Mori with Suzuki. Reconsideration and withdrawal of **Rejection 2** are respectfully requested.

Suzuki and Yamaoka

With respect to **Rejection 3**, the Examiner has taken the position that present claims 5-6 are obvious over the combination of Suzuki and Yamaoka et al. (U.S. Patent No. 6,417,904 "Yamaoka").

The Examiner will note that present claim 5 has been amended to depend from claim 4. Also, claim 6 depends from claim 5. Applicants consider that claims 1 and 4, on which claims 5-6 depend are patentable over Suzuki (either alone or in combination with Mori) for the reasons set forth above. Applicants respectfully submit that Yamaoka fails to cure the deficiencies of Suzuki (and optionally Mori).

In addition, one of ordinary skill in the art would not be taught, suggested or motivated by Yamaoka to arrive at the presently claimed invention for the following reasons.

Yamaoka discloses a liquid-crystal display device in which the optical compensatory film and a polarizing plate are disposed on at least one side of a liquid-crystal cell (lines 11 to 14 of ABSTRACT of Yamaoka). Yamaoka discloses that the optical compensatory film comprises a transparent film base, and a birefringent phase retarder layer adhesively supported by the transparent film base, the transparent film base having a water absorption coefficient of not higher that 1.0% (at 23 °C for 24 hours) and having a photoelastic coefficient of not larger than 30×10^{-12} m^2/N is used as the transparent film base (column 3, lines 29 to 34 of Yamaoka). With respect to the birefringent phase retarder layer, Yamaoka discloses as follows:

> "The birefringent phase retarder layer can be formed, for example, of a suitable birefringent phase retarder layer such as a stretched film layer or an orientation layer of a liquid-crystal polymer in accordance with the purposes. Incidentally, for enlargement of the viewing angle, a gradient orientation layer of a discotic liquid-crystal polymer, or the like, can be used advantageously." (See column 4, lines 27 to 34 of Yamaoka).

In addition, Yamaoka disclose the purpose of the invention as follows:

> "An object of the present invention is to develop an optically compensatory film exhibiting birefringence characteristic hardly changed by an external stimulus such as heat and humidity, excellent in stability of the birefringence characteristics and excellent in weight saving per unit area." (See column 1, lines 41 to 45 of Yamaoka).

It is clear that the "*optically compensatory film exhibiting birefringence characteristic*" to be improved by Yamaoka is the optical compensatory film having a cellulose film base, and a gradient orientation layer of a discotic liquid-crystal polymer provided on the base which is referred to in the "Description of the Related Art" section (see column 1, lines 19 to 22 of Yamaoka). This optical compensatory film had the disadvantage of being susceptible to change by an external stimulus such as heat and humidity (column 1, lines 29 to 31 of Yamaoka). However, Yamaoka does not teach or suggest that the "*optically compensatory film exhibiting birefringence characteristic*" is a laminate comprising a layer of a transparent resin which is laminated to at least one face of a layer of the material having a negative value of intrinsic birefringence as claimed in the presently claimed invention. As such, for this reason and the reasons discussed above, reconsideration and withdrawal of **Rejection 3** are respectfully requested.

Suzuki and Uejima

With respect to **Rejection 4**, the Examiner has taken the position that present claim 7 is obvious over the combination of Suzuki and Uejima (JP 2003-246014).

Applicants note that claim 7 depends from claim 1. Applicants respectfully submit that Uejima fails to cure the deficiencies of Suzuki as mentioned above. As such, reconsideration and withdrawal of **Rejection 4** are respectfully requested.

Suzuki and Shuzo

With respect to **Rejection 5**, the Examiner has taken the position that present claim 8 is obvious over the combination of Suzuki and Shuzo (JP 2003-149643).

Applicants note that claim 8 depends from claim 1. Applicants respectfully submit that Shuzo fails to cure the deficiencies of Suzuki as mentioned above. As such, reconsideration and withdrawal of **Rejection 5** are respectfully requested.

In summary, the subject matter of the presently claimed invention is not anticipated by Suzuki and is not obvious based on any combination of the cited references. It is submitted therefore, that the presently claimed invention is allowable. Reconsideration is respectfully requested. Allowance is solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq., Reg. No. 43,575, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: **September 21, 2009**

Respectfully submitted,

By _____
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Attached: Declaration under 37 CFR 1.132 by Mr. Kenichi Harai